MITSUBISHI ELECTRIC

General-Purpose AC Servo

MELSERVO- J2-Super Series

400VAC Compatible Instructions and Cautions for Safe Use of AC Servos

If this is the first time for you to use the MELSERVO-J2-Super Series, the optionally available MR-J2S-□ Servo Amplifier Instruction Manual, MELSERVO-J2-Super 400VAC compatible Servo Amplifier Supplementary Instruction Manual and MELSERVO Servo Motor Instruction Manual are required. Always purchase them and use the MELSERVO-J2-Super Series safely.

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This guide uses recycled paper.
Specifications subject to change without notice.

● Safety Instructions ●

(Always read these instructions before using the equipment.)

Install, and peruse all this guide and attached documents before the drive and maintenance and the check. After that, use these correctly. Use it after it is skilled of the knowledge of the equipment, information on safety, and all of notes.
In this guide, the safety instruction levels are classified into "WARNING" and "CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight injury to personnel or may cause physical damage.

Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.
What must not be done and what must be done are indicated by the following diagrammatic symbols.

: Indicates what must not be done. For example, "No Fire" is indicated by .

: Indicates what must be done. For example, grounding is indicated by .

In this guide, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".
After reading this guide, always keep it accessible to the operator.

1. To prevent electric shock, note the following

⚠ WARNING

- Before wiring or inspection, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Then, confirm that the voltage between P and N is safe with a voltage tester and others. Otherwise, an electric shock may occur. In addition, always confirm from the front of the servo amplifier, whether the charge lamp is off or not.
- Connect the servo amplifier and servo motor to ground.
- Any person who is involved in wiring and inspection should be fully competent to do the work.
- Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, you may get an electric shock.
- Operate the switches with dry hand to prevent an electric shock.
- The cables should not be damaged, stressed loaded, or pinched. Otherwise, you may get an electric shock.
- During power-on or operation, do not open the front cover. You may get an electric shock.
- Do not operate the servo amplifier with the front cover removed. High-voltage terminals and charging area are exposed and you may get an electric shock.
- Except for wiring or periodic inspection, do not remove the front cover even if the power is off. The servo amplifier is charged and you may get an electric shock.

2. To prevent fire, note the following

⚠ CAUTION

- Install the servo amplifier, servo motor and regenerative resistor on incombustible material. Installing them directly or close to combustibles will lead to a fire.
- Always connect a magnetic contactor between the main circuit power supply and L_1, L_2, and L_3 of the servo amplifier, and configure the wiring to be able to shut down the power supply on the side of the servo amplifier's power supply. If a magnetic contactor is not connected, continuous flow of a large current may cause a fire when the servo amplifier malfunctions.
- When a regenerative resistor is used, use an alarm signal to switch main power off. Otherwise, a regenerative transistor fault or the like may overheat the regenerative resistor, causing a fire.
- Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the servo amplifier and servo motor.
- Always connect a no-fuse breaker to the power supply of the servo amplifier.

3. To prevent injury, note the follow

⚠ CAUTION

- Only the voltage specified in the instruction manual should be applied to each terminal, Otherwise, a burst, damage, etc. may occur.
- Connect the terminals correctly to prevent a burst, damage, etc.
- Ensure that polarity (+, −) is correct. Otherwise, a burst, damage, etc. may occur.
- Take safety measures, e.g. provide covers, to prevent accidental contact of hands and parts (cables, etc.) with the servo amplifier heat sink, regenerative resistor, servo motor, etc. since they may be hot while power is on or for some time after power-off. Their temperatures may be high and you may get burnt or a parts may damaged.
- During operation, never touch the rotating parts of the servo motor. Doing so can cause injury.

4. Additional instructions

The following instructions should also be fully noted. Incorrect handling may cause a fault, injury, electric shock, etc.

(1) Transportation and installation

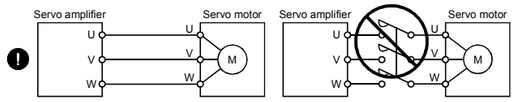
⚠ CAUTION

- Transport the products correctly according to their mass.
- Use the eye-bolt of the servo motor to only transport the servo motor and do not use it to transport in the condition to have installed a servo motor on the machine.
- Stacking in excess of the specified number of products is not allowed.
- Do not carry the servo motor by the cables, shaft or encoder.
- Do not hold the front cover to transport the servo amplifier. The servo amplifier may drop.
- Install the servo amplifier in a load-bearing place in accordance with the instruction manual.
- Do not climb or stand on servo equipment. Do not put heavy objects on equipment.
- The servo amplifier and servo motor must be installed in the specified direction.
- Leave specified clearances between the servo amplifier and control enclosure walls or other equipment.
- Do not install or operate the servo amplifier and servo motor which has been damaged or has any parts missing.
- Do not block the intake and exhaust areas of the servo amplifier and servo motor which has a cooling fan. Doing so may cause faults.
- Do not drop or strike servo amplifier or servo motor. Isolate from all impact loads.
- When storing or using the servo amplifier and servo motor, comply with the environmental conditions given in the Servo Amplifier Instruction Manual and Servo Motor Instruction Manual.
- Securely attach the servo motor to the machine. If attach insecurely, the servo motor may come off during operation.
- The servo motor with reduction gear must be installed in the specified direction to prevent oil leakage.
- Take safety measures, e.g. provide covers, to prevent accidental access to the rotating parts of the servo motor during operation.
- Never hit the servo motor or shaft, especially when coupling the servo motor to the machine. The encoder may become faulty.
- Do not subject the servo motor shaft to more than the permissible load. Otherwise, the shaft may break.
- When the equipment has been stored for an extended period of time, contact your local sales office.
- When treating the servo amplifier be careful about the edged parts such as the corners of the servo amplifier.
- The servo amplifier must install in the metal cabinet (control box).

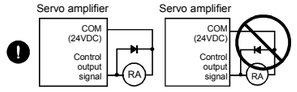
(2) Wiring

⚠ CAUTION

- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly.
- Do not install a power capacitor, surge absorber or radio noise filter (FR-BIF option) between the servo motor and servo amplifier.
- Connect the wires to the correct phase terminals (U, V, W) of the servo amplifier and servo motor. Otherwise, the servo motor does not operate properly.
- Connect the servo motor power terminal (U, V, W) to the servo motor power input terminal (U, V, W) directly. Do not let a magnetic contactor, etc. intervene.



- Do not connect AC power directly to the servo motor. Otherwise, a fault may occur.
- The surge absorbing diode installed to the DC relay for control output should be fitted in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate.



- When the cable is not tightened enough to the terminal block (connector), the cable or terminal block (connector) may generate heat because of the poor contact. Be sure to tighten the cable with specified torque.

(3) Test run adjustment

⚠ CAUTION

- Before operation, check the parameter settings. Improper settings may cause some machines to perform unexpected operation.
- The parameter settings must not be changed excessively. Operation will be insatiable.

(4) Usage

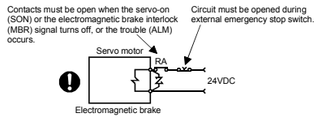
⚠ CAUTION

- Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.
- Any person who is involved in disassembly and repair should be fully competent to do the work.
- Before resetting an alarm, make sure that the run signal of the servo amplifier is off to prevent an accident. A sudden restart is made if an alarm is reset with the run signal on.
- Do not modify the equipment.
- Use a noise filter, etc. to minimize the influence of electromagnetic interference, which may be caused by electronic equipment used near the servo amplifier.
- Use the servo amplifier with the specified servo motor.
- The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not be used for ordinary braking.
- For such reasons as service life and mechanical structure (e.g. where a ball screw and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To ensure safety, install a stopper on the machine side.
- Burning or breaking a servo amplifier may cause a toxic gas. Do not burn or break a servo amplifier.

(5) Corrective actions

⚠ CAUTION

- When it is assumed that a hazardous condition may take place at the occur due to a power failure or a product fault, use a servo motor with electromagnetic brake or an external brake mechanism for the purpose of prevention.
- Configure a circuit so that the electromagnetic brake activates with the external emergency stop switch at the same time.


Contacts must be open when the servo-on (SON) or the electromagnetic brake interlock (MBR) signal turns off, or the trouble (ALM) occurs.
Circuit must be opened during external emergency stop switch.
Servo motor
RA
24VDC
Electromagnetic brake

- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- When power is restored after an instantaneous power failure, keep away from the machine because the machine may be restarted suddenly (design the machine so that it is secured against hazard if restarted).

(6) Maintenance, inspection and parts replacement

⚠ CAUTION

- With age, the electrolytic capacitor of the servo amplifier will deteriorate. To prevent a secondary accident due to a fault, it is recommended to replace the electrolytic capacitor every 10 years when used in general environment.
  Please contact your local sales office.

(7) General instruction

- To illustrate details, the equipment in the diagrams of this guide and instruction manual may have been drawn without covers and safety guards. When the equipment is operated, the covers and safety guards must be installed as specified. Operation must be performed in accordance with this guide and instruction manual.

● DISPOSAL OF WASTE ●

Please dispose a servo amplifier, battery (primary battery) and other options according to your local laws and regulations.

BATTERY transportation

MR-BAT and A6BAT are lithium metal batteries. MR-BAT and A6BAT are not subject to the dangerous goods (Class 9) of the UN Recommendations.
To transport lithium metal batteries and lithium metal batteries contained in equipment by means of transport subject to the UN Recommendations, take actions to comply with the following regulations: the United Nations Recommendations on the Transport of Dangerous Goods, the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO), and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO).
To transport the batteries, check the latest standards or the laws of the destination country and take actions.
For more information, consult our branch or representative. (As of May 2013)

⚠ EEP-ROM life

The number of write times to the EEP-ROM, which stores parameter settings, etc., is limited to 100,000. If the total number of the following operations exceeds 100,000, the servo amplifier and/or converter unit may fail when the EEP-ROM reaches the end of its useful life.

- Write to the EEP-ROM due to parameter setting changes
- Home position setting in the absolute position detection system
- Write to the EEP-ROM due to device changes

1. INTRODUCTION

1.1 Introduction to the manuals

If this is the first time for you to use the MELSERVO-J2-Super Series, the optionally available MR-J2S- □ Servo Amplifier Instruction Manual (see the list below) and MELSERVO Servo Motor Instruction Manual (SH(NA)3181) are required. Please read them all carefully to use the MELSERVO-J2-Super Series safely.

Servo amplifier	Manual name	Manual No.
MR-J2S-A	MR-J2S- □ A Servo Amplifier Instruction Manual	SH(NA)030006
	MR-J2S-400VAC Compatible Servo Amplifier Supplementary Instruction Manual	SH(NA)030026
MR-J2S-B	MR-J2S- □ B Servo Amplifier Instruction Manual	SH(NA)030007
	MR-J2S-400VAC Compatible Servo Amplifier Supplementary Instruction Manual	SH(NA)030026

1.2 Contents of the packing

After unpacking, check the rating plate to confirm that the servo amplifier and servo motor you received are as you ordered.

(1) Servo amplifier

Contents	Quantity
Servo amplifier [pc.]	1
CNP1・CNP2・CNP3・CN4 [pc.] (Note)	1 each
MELSERVO-J2-Super Series Instructions and Cautions for Safe Use of AC Servos (This guide) [pc.]	1

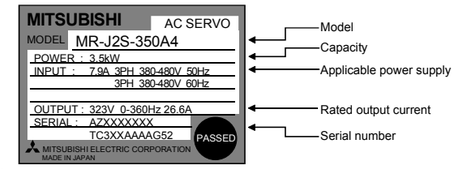
Note. Only for the MR-J2S-200A4 or less

(2) Servo motor

Contents	Quantity
Servo motor [pc.]	1
Safety Instructions for Use of AC Servo (for motors) [pc.]	1

1.3 Model code definition

(1) Rating plate



(2) Model code

MR-J2S-□□□□

Series name

Optional feature

Symbol	Optional feature
None	Standard feature
-PX	This symbol is affixed to indicate that the 11k to 12kW servo amplifier does not need the external regenerative resisitor equipped as standard because the regenerative brake option (MR-RB6B-4, MR-RB60-4, MR-RB6K-4), brake unit (FR-BU2-H) or power return converter (FR-RC) is purchased.

Three-phase 380 to 480VAC power supply specifications

Corresponding

Symbol	Corresponding
A	General-purpose interface
B	SSCNET compatible

Rated output

Symbol	Rated output [kW]
60	0.6
100	1
200	2
350	3.5
500	5
700	7
11K	11
15K	15
22K	22

2. COMPLIANCE WITH THE EUROPEAN EC DIRECTIVES

2.1 What are EC directives?

The EC directives were issued to standardize the regulations of the EU countries and ensure smooth distribution of safety-guaranteed products. In the EU countries, the machinery directive (effective in January, 1995), EMC directive (effective in January, 1996) and low voltage directive (effective in January, 1997) of the EC directives require that products to be sold should meet their fundamental safety requirements and carry the CE marks (CE marking). CE marking applies also to machines and equipment into which servos have been installed.

(1) EMC directive

The EMC directive also applies to the servo amplifier, and this servo amplifier is designed to comply with the EMC directive. The EMC directive also applies the servo amplifier-incorporated machines and equipment. This requires the EMC filters to be used with the servo amplifier-incorporated machines and equipment to comply with the EMC directive. For specific EMC directive conforming methods, refer to the EMC Installation Guidelines (IB(NA)67310).

(2) Low voltage directive

The low voltage directive also applies to the servo amplifier, and this servo amplifier is designed to comply with the low voltage directive.

(3) Machinery directive

Servo amplifier is a main component in a machine configuration. Do not allow using the machine until the machine in which these servo amplifiers are mounted is declared to comply with the machinery directive.

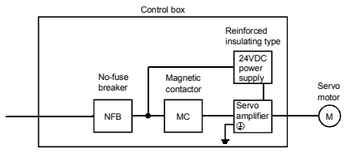
2.2 For compliance

Be sure to perform an appearance inspection of every unit before installation. In addition, have a final performance inspection on the entire machine/system, and keep the inspection record.

(1) Servo amplifiers and servo motors used

Use the servo amplifiers and servo motors which standard product.
Servo amplifier series: MR-J2S-60A4 to 22KA4
MR-J2S-60B4 to 22KB4
Servo motor series : HC-SFS□4, HA-LFS□4

(2) Structure



(3) Environment

Operate the servo amplifier at or above pollution degree 2 set forth in IEC/EN 60664-1. For this purpose, install the servo amplifier in a control box which is protected against water, oil, carbon, dust, dirt, etc. (IP54).

(4) Power supply

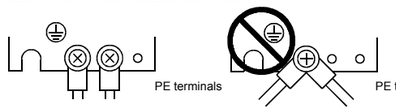
(a) This servo amplifier can be used under the conditions of the overvolttage category Ⅲ set forth in IEC/EN 60664-1, a reinforced insulating transformer is not required in the power input section.
Unit shall be supplied from a three phase earthed neutral system.

(b) For the interface power supply, use a 24VDC power supply with reinforced insulation on I/O terminals.

(5) Grounding

(a) To prevent an electric shock, the protective earth (PE) terminal (marked ⏚) of the servo amplifier must be connected to the protective earth (PE) of the control box.

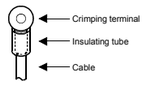
(b) Do not connect two ground cables to the same protective earth (PE) terminal. Always connect cables to the terminals one-to-one.



(c) If a leakage current breaker is used to prevent an electric shock, the protective earth (PE) terminals of the servo amplifier must be connected to the corresponding earth terminals.

(6) Wiring

(a) The cables to be connected to the terminal block of the servo amplifier must have crimping terminals provided with insulating tubes to prevent contact with adjacent terminals.



(b) Use the servo motor side power connector which complies with the IEC/EN Standard. The IEC/EN Standard-compliant power connector sets are available as options.

(c) The servo amplifier must install in the metal cabinet (control box).

(7) Auxiliary equipment and options

(a) Use the no-fuse breaker and magnetic contactor models which are IEC/EN Standard-compliant products given in the MR-J2S-400VAC Compatible Servo Amplifier Supplementary Instruction Manual.

(b) The sizes of the wires given in the MR-J2S-400VAC Compatible Servo Amplifier Supplementary Instruction Manual meet the following conditions. For use in any other conditions, follow Table 5 and Annex C of IEC/EN 60204-1.
- Ambient temperature: 40℃ (104℉)
- Sheath : PVC (polyvinyl chloride)
- Installation on wall surface or open table tray

(c) Use the EMC filter for noise reduction.

(8) Performing EMC tests

When EMC tests are run on a machine/device into which the servo amplifier has been installed, it must conform to the electromagnetic compatibility (immunity/emission) standards after it has satisfied the operating environment/electrical equipment specifications.
For the other EMC directive guidelines on the servo amplifier, refer to the EMC Installation Guidelines (IB(NA)67310).

3. CONFORMANCE WITH UL/C-UL STANDARD

This servo amplifier complies with UL 508C and CSA C22.2 No.14 standard.
Refer to section 1.3 (2) for the servo amplifier model names described in the tables and figures.

(1) Servo amplifier and servo motor used

Use the servo amplifiers and servo motors which standard product.

Servo amplifier	HC-SFS	Servo motor HA-LFS		
		1000r/min	1500r/min	2000r/min
MR-J2S-60A4/B4	524			
MR-J2S-100A4/B4	1024			
MR-J2S-200A4/B4	1524・2024			
MR-J2S-350A4/B4	3524			
MR-J2S-500A4/B4	5024			
MR-J2S-700A4/B4	7024	6014	701M4	
MR-J2S-11KA4/B4		80141・2K14	11K1M4	11K24
MR-J2S-15KA4/B4		15K14	15K1M4	15K24
MR-J2S-22KA4/B4		20K14・25K14	22K1M4	22K24

(2) Installation

The MR-J2S series have been approved as the products which have been installed in the electrical enclosure.
The minimum enclosure size is based on 150% of each MR-J2S combination.
And also, design the enclosure so that the ambient temperature in the enclosure is 55℃ (131℉) or less, refer to the spec manual.
The servo amplifier must install in the metal cabinet (control box).

(3) Short circuit rating (SCCR: Short Circuit Current Rating)

Suitable For Use In A Circuit Capable Of Delivering Not More Than 100 kA rms Symmetrical Amperes, 500 Volts Maximum.

(4) Flange

Mount the servo motor on a flange which has the following size or produces an equivalent or higher heat dissipation effect.

Flange size [mm (in)]	Servo motor HC-SFS	Servo motor HA-LFS
250×250×12 (9.84×9.84×0.47)	524 to 1524	
300×300×12 (11.81×11.81×0.47)	2024・3524	
650×650×35 (25.59×25.59×1.38)	5024・7024	6014 to 12K14 701M4・15K1M4 11K24 to 22K24
950×950×35 (37.43×37.43×1.38)		15K14 to 22K14 22K1M4

(5) About wiring protection

For installation in United States, branch circuit protection must be provided, in accordance with the National Electrical Code and any applicable local codes.
For installation in Canada, branch circuit protection must be provided, in accordance with the Canada Electrical Code and any applicable provincial codes.

(6) Capacitor discharge time

The capacitor discharge time is as follows.To ensure safety, do not touch the charging section for 15 minutes after power-off.

Servo amplifier	Discharge time (min)
MR-J2S-60A4/B4	1
MR-J2S-100A4/B4	2
MR-J2S-200A4/B4	2
MR-J2S-350A4/B4	3
MR-J2S-500A4/B4	5
MR-J2S-700A4/B4	8
MR-J2S-11KA4/B4	4
MR-J2S-15KA4/B4	6
MR-J2S-22KA4/B4	8

(7) Options, peripheral devices

Use the UL/C-UL Standard-compliant products.
Use the no-fuse breaker (UL489 Listed MCCB) or a Class K5 fuse indicated in the table below.

Servo amplifier	No-fuse breaker (Note) Current	Voltage AC	Fuse Current [A]	Fuse Voltage AC [V]
MR-J2S-60□4	30A frame 5A	600Y/347V	10	600
MR-J2S-100□4	30A frame 10A		15	
MR-J2S-200□4	30A frame 15A		20	
MR-J2S-350□4	30A frame 20A		30	
MR-J2S-500□4	30A frame 30A		40	

Servo amplifier	No-fuse breaker (Note) Current	Voltage AC	Fuse Current [A]	Fuse Voltage AC [V]
MR-J2S-700□4	50A frame 40A	600Y/347V	55	600
MR-J2S-11K□4	60A frame 60A		90	
MR-J2S-15K□4	100A frame 75A		125	
MR-J2S-22K□4	225A frame 125A		150	

Note. When the power factor improving reactor is not used.

(8) Selection example of wires

To comply with the UL/C-UL Standard, use UL-approved copper wires rated at 60/75℃ (140/167℉) for wiring.

Servo amplifier	(Note 1) Wires [mm²] L1・L2・L3・⏚	L11・L21	U・V・W・P1・P・⏚ (Note 2)	P・C	B1・B2	BU・BV・BW
MR-J2S-60A4/B4・100A4/B4	2(AWG14):a	1.25 (AWG16)	1.25(AWG16):a	2 (AWG14):a	1.25 (AWG16)	
MR-J2S-200A4/B4			2(AWG14):a			
MR-J2S-350A4/B4	3.5(AWG12):b		3.5(AWG12):b			
MR-J2S-500A4/B4・700A4/B4	5.5(AWG10):b		5.5(AWG10):b			
MR-J2S-11KA4/B4	8(AWG8):c		8(AWG8):c	3.5 (AWG12):b	2 (AWG14)	2(AWG14)
MR-J2S-15KA4/B4・22KA4/B4	14(AWG6):d		22(AWG4):e	5.5 (AWG10):b		

Note 1. Alphabets in the table indicate crimping tools. Refer to the following table for the crimping terminals and crimping tools.
2. 7kW or less does not have P_1.

Use the wires of the following sizes with the brake unit (FR-BU) and power return converter (FR-RC).

Model	Wires [mm²]
FR-BU-H15K	3.5(AWG12)
FR-BU-H30K	
FR-BU-H55K	8(AWG8)

Table: Recommended crimping terminals

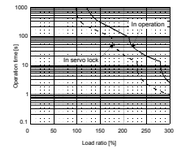
Symbol	Servo amplifier side crimping terminal: Crimping terminals	Applicable tool	Manufacturer name
a	32959	47387	Tyco Electronics
b	FVD5.5-4	YNT-1210S	Japan Solderless Terminals
c	FVD8-5	Body YF-1・E-4 Head YNE-38 Dies DH-111・DH-121	
d	FVD14-6	Body YF-1・E-4 Head YNE-38 Dies DH-112・DH-122	
e	FVD22-6	Body YF-1・E-4 Head YNE-38 Dies DH-113・DH-123	

(9) Terminal block tightening torque

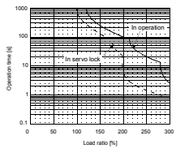
Servo amplifier	Tightening torque [N・m] ([lb・in]) TE1	TE2	PE
MR-J2S-60A4/B4 to 200A4/B4	1.2 (10)	1.0 (9)	1.2 (10)
MR-J2S-350A4/B4・500A4/B4		0.8 (7)	
MR-J2S-700A4			
MR-J2S-11KA4/B4・15KA4/B4	3.0 (26)	1.2 (10)	6.0 (52)
MR-J2S-22KA4/B4	6.0 (52)		

(10)Overload Protection Characteristics

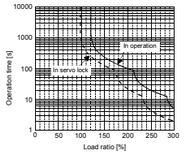
An electronic thermal relay is built in the servo amplifier to protect the servo motor, servo amplifier and servo motor power line from overloads. The operation characteristics of the electronic thermal relay are shown below. It is recommended to use an unbalanced torque-generated machine, such as a vertical motion shaft, so that unbalanced torque is not more than 70% of the rated torque.
Servo amplifier MR-J2S series have servo motor overload protection. (The motor full load current is 115% rated current.)



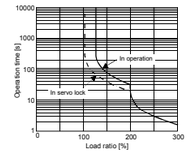
MR-J2S-60A4/B4 to 100A4/B4



MR-J2S-200A4/B4・350A4/B4



MR-J2S-500A4/B4・700A4/B4



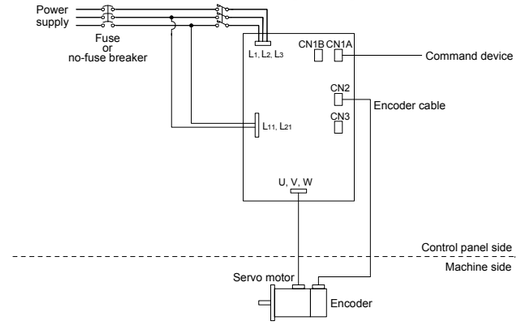
MR-J2S-11KA4/B4 to 22KA4/B4

(11)Over-temperature protection for motor

Motor Over temperature sensing is not provided by the drive.

(12)Figure configuration

Representative configuration example to conform to the UL/C-UL standard is shown below. The earth wiring is excluded from the figure configuration.



4. INSPECTION

⚠ WARNING

- Before starting maintenance and/or inspection, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Then, confirm that the voltage between P and N is safe with a voltage tester and others. Otherwise, an electric shock may occur. In addition, always confirm from the front of the servo amplifier whether the charge lamp is off or not.
- Any person who is involved in inspection should be fully competent to do the work. Otherwise, you may get an electric shock. For repair and parts replacement, contact your safes representative.

POINT

- Do not test the servo amplifier with a megger (measure insulation resistance), or it may become faulty.
- Do not disassemble and/or repair the equipment on customer side.

(1) Inspection

It is recommended to make the following checks periodically.

(a) Check for loose terminal block screws. Retighten any loose screws.

(b) Check the servo motor bearings, brake section, etc. for unusual noise.

(c) Check the cables and the like for scratches and cracks. Perform periodic inspection according to operating conditions.

(d) Check the servo motor shaft and coupling for misalignment.

(2) Life

The following parts must be changed periodically as listed below. If any part is found faulty, it must be changed immediately even when it has not yet reached the end of its life, which depends on the operating method and environmental conditions.
For use in the atmosphere having much oil mist, dust, etc., clean and inspect every three months.
For parts replacement, please contact your sales representative.

	Part name	Standard life
Servo amplifier	Smoothing capacitor	10 years
	Relay	Number of power-on and number of emergency stop times: 100,000 times
	Cooling fan	10,000 to 30,000 hours (2 to 3 years)
	Absolute position battery	Refer to the MR-J2S-□ Servo Amplifier Instruction Manual.
Servo motor	Bearings	20,000 to 30,000 hours
	Encoder	20,000 to 30,000 hours
	Oil seal, V ring	5,000 hours
	Cooling fan	20,000 hours

(a) Smoothing capacitor
Affected by ripple currents, etc. and deteriorates in characteristic. The life of the capacitor greatly depends on ambient temperature and operating conditions. The capacitor will reach the end of its life in 10 years of continuous operation in normal air-conditioned environment (Surrounding air temperature of 40℃ (104℉) or less.).

(b) Relays
Their contacts will wear due to switching currents and contact faults occur. Relays reach the end of their life when the cumulative number of power-on and emergency stop times is 100,000, which depends on the power supply capacity

(c) Servo amplifier cooling fan
The cooling fan bearings reach the end of their life in 10,000 to 30,000 hours. Normally, therefore, the fan must be changed in a few years of continuous operation as a guideline.
It must also be changed if unusual noise or vibration is found during inspection.

(d) Servo motor bearings
When the servo motor is run at rated speed under rated load, change the bearings in 20,000 to 30,000 hours as a guideline. This differs on the operating conditions. The bearings must also be changed if unusual noise or vibration is found during inspection.

(e) Servo motor oil seal, V ring
Must be changed in 5,000 hours of operation at rated speed as a guideline. This differs on the operating conditions. These parts must also be changed if oil leakage, etc. is found during inspection.

(f) Servo motor cooling fan
The design life of the cooling fan is 20,000 hours. Change the cooling fan periodically.

5. ALARMS AND WARNINGS

5.1 Alarms

Indication	Name
10	Under voltage
12	Memory error 1
13	Clock error
15	Memory error 2
16	Encoder error 1
17	Board error
19	Memory error 3
1A	Motor combination error
20	Encoder error 2
24	Main circuit error
25	Absolute position erase

Indication	Name
30	Regenerative error
31	Over speed
32	Over current
33	Over voltage
34	CRC error
35	Command pulse frequency error
36	Transfer error
37	Parameter error
45	Main circuit device Overheat

Indication	Name
46	Servo motor overheat
50	Overload 1
51	Overload 2
52	Error excessive
8A	Serial communication time-out error
8E	Serial communication error
88	Watchdog

5.2 Warnings

Indication	Name
92	Battery cable disconnection warning
96	Home position setting warning
9F	Battery warning
E0	Excessive regenerative warning

Indication	Name
E1	Overload warning
E3	Absolute position counter warning
E4	Parameter warning
E5	ABS time-out warning
E6	Servo emergency stop warning

Indication	Name
E7	Controller emergency stop warning
E9	Main circuit off warning
EA	ABS servo-on warning
EE	SSCNET error warning

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

[Term]

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[Limitations]

(1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged.
However, it will not be charged if we are responsible for the cause of the failure.

(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
(i) : a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
(ii) : a failure caused by any alteration, etc. to the Product made on your side without our approval
(iii) : a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
(iv) : a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
(v) : any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
(vi) : a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
(vii) : a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
(viii) : any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

4. Exclusion of responsibility for compensation against loss of opportunity, secondary loss, etc.

Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

(1) For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.

(2) Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at general industries.
Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.